

THE VARIATIONS OF
LILIUM CANADENSE LINNAEUS¹

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IN the New Britton and Brown Illustrated Flora **1**: 418. 1952, H. A. Gleason, apparently following the opinion expressed by E. D. Hull, RHODORA **44**: 220–7. 1942, has placed *Lilium michiganense* Farwell in the synonymy of *L. superbum* L. In RHODORA **44**: 453–6. 1942, Hull's opinion was carefully discussed and refuted by E. T. Wherry, who pointed out numerous differences between the two entities in pubescence of the leaves, dorsal ribbing of the tepals, length and curvature of the stamens, and extent of green zone at base of tepals. To these differences, M. L. Fernald, in Gray's Manual of Botany, 8th ed., 1950, p. 435, has added another character derived from the inflorescence. We agree with Wherry and Fernald that these two entities are distinct, but the degree of distinctiveness is not as sharp as Wherry would lead one to believe. While *L. michiganense* is normally minutely scabrous along the margin of leaves and on the back of the main veins, occasional smooth specimens, such as *L. H. Wright*, Yates Co., N. Y., do exist and papillose leaf-margins and veins occur in *L. superbum*. In the latter species the anthers are longer, narrower and curved, but they may be as short as 11 mm. as shown by specimens and described by Wherry. On the other hand the anthers of *L. michiganense* are generally shorter, thicker and straight, but may occasionally be curved or thin and, as described by Fernald, up to 17 mm. long. The dorsal ribbing of the perianth segments was quite clearly illustrated by Wherry, op. cit., p. 454, but an occasional specimen of *L. michiganense* will show the characteristic ribs of *L. superbum*. Unfortunately, the extent of the green zone at the base of the tepals cannot be checked on dried specimens, but this difference does not appear to be very sharp. It is described by Wherry, loc. cit., as follows: "In . . . *L. michiganense* this green area is mostly less than 10 mm. long In *L. superbum* it is 10 to 15 mm. long. . . ."

Heavily flowered specimens of *L. superbum* most often have the flowers in racemes; but umbellate, few-flowered and one-

¹ Contribution No. 1488, from the Botany and Plant Pathology Division, Science Service, Canada Department of Agriculture, Ottawa, Ontario.

flowered specimens which have the same type of inflorescence as *L. michiganense*, also occur. However, *L. michiganense* never presents the racemose type of inflorescence.

In none of the six characters discussed above are these two entities sharply distinct; and, as frequent intermediates occur, retention of these taxa at specific level does not seem to be warranted. The two populations, however, are fairly well marked and most specimens can be referred quite satisfactorily to one or the other taxon and retention at an infraspecific level seems amply justified on the basis of the characters described by Wherry.

L. michiganense is more closely related to *L. canadense* than to *L. superbum*. This was brought out by Wherry, op. cit., p. 435, who stated that "the intermediate *L. michiganense* surely does not 'belong to *L. superbum*,' lying instead close to *L. canadense*."

With the above statement we are in full agreement, although on general appearance alone *L. michiganense* could be readily confused with *L. superbum* because both entities have strongly recurved red-suffused tepals.

The degree of distinctiveness of *L. michiganense* and *L. canadense* was submitted to close scrutiny. Of the four usually recognized diagnostic characters, one, the flower color, could not be used with any degree of accuracy because, upon drying, flowers often become more reddish or lose all traces of red color. This change in color is evidenced by the discrepancies between field notes and the present color of the dried flower.

The three other characters are as follows:

<i>L. canadense</i>	<i>L. michiganense</i>
1—Tepals arched, not recurved; stamens and style usually included or nearly so.	1—Tepals strongly recurved, their tips nearly reaching or surpassing the summit of the tube; stamens and style long exserted.
2—Filaments straight or nearly so.	2—Filaments outwardly arched, frequently incurved at tip.
3—Stigma deeply lobed.	3—Stigma merely emarginate, subglobose to shallowly lobed.

Of the 75 odd sheets at hand, only 49 have fully developed flowers showing all characters listed above. Sorting the specimens for all three characters gives us the following results:

12 specimens are typical *L. canadense*
 10 specimens are typical *L. michiganense*
 27 specimens are intermediate

This is a very high ratio of intermediates, but 17 of these intermediates are intermediate for style only. If we contrast this number of 17 intermediates for style against the 10 and 12 specimens of each entity that are typical for all three characters, it is obvious that the lobation of the style has no diagnostic value whatsoever.

Re-sorting our specimens for the first two characters only gives us the following results and distributions:

17 specimens are typical *L. canadense*: 4 Nova Scotia, 2 New Brunswick, 7 Quebec, 1 New York, 2 Pennsylvania and 1 West Virginia.

22 specimens are typical *L. michiganense*: 14 Ontario, 1 Indiana, 1 Illinois, 3 Michigan, 1 Wisconsin, 1 Minnesota and 1 Kansas.

10 specimens are intermediate: 1 Nova Scotia, 1 New Brunswick, 2 Quebec, 4 Ontario, 1 Massachusetts and 1 Pennsylvania.

With only two diagnostic characters and such a high proportion of intermediates, retention of specific status for these two entities seems unjustified. Yet the two populations appear to be sufficiently distinct both morphologically and geographically to warrant retention at an infraspecific level.

We therefore consider that the recognized taxa of the *Lilium canadense* group should be brought together and subordinated as follows:

Lilium canadense L.

ssp. *canadense*

var. *canadense*

f. *canadense*

f. *rubrum* Britton

var. *editorum* Fern.

ssp. *michiganense* (Farwell) Boivin & Cody

f. *michiganense*

f. *uniflorum* (Farwell) Boivin & Cody

f. *peramoenum* (Farwell) Boivin & Cody

ssp. *superbum* (L.) Boivin & Cody

These taxa may be briefly characterized as follows:

LILIUM CANADENSE L. ssp. CANADENSE. *L. canadense* L., Sp. Pl. 1: 303. 1753; *L. penduliflorum* DC. ex Redouté, Les Liliacées 2: 105. 1805 (non vidimus); *L. pendulum* Spae, Mém. Cour. Ac. Roy. Sc. Brux. Vol. 19, Essai d'une monographie du genre Lis, p. 28. 1847 (non vidi-

mus) nec *L. pendulum* Noronha 1790. Leaves usually scaberulous along the margin and along the nerves underneath; flowers solitary to umbellate (occasionally disposed in a group of umbels); tube with a green zone at base up to 10 mm. long; tepals recurved from near the middle, but not reflexed, yellow to orange, occasionally suffused with red, or completely red; midrib of petal more or less rounded on back; stamens and style included or only slightly exerted; filaments straight, rarely curved; anthers commonly oblong to lance-oblong, nearly always straight, usually less than 12 mm. long.

LILIUM CANADENSE L. var. **CANADENSE**. Median cauline leaves lanceolate to linear-lanceolate, usually more or less acuminate at tip; flowers commonly yellow to orange, often suffused with red, rarely deep red; petals usually broad.

LILIUM CANADENSE L. f. **CANADENSE**. *L. canadense flavum* Pursh, Fl. Am. Sept. 1: 229. 1814; *L. canadense flavum* Hort. ex Waugh, Bot. Gaz. 27: 356. 1899; *L. canadense* var. *flavum* (Hort. ex Waugh) Waugh ex Bailey, Cycl. Am. Hort. 2: 922. 1900; *L. canadense* f. *flavum* (Hort. ex Waugh) Vict., Contr. Lab. Bot. Un. Montr. 14: 15. 1929; *L. canadense* var. *luteum* Waugh ex Bailey, Cycl. Am. Hort. 2: 922. 1900 (nomen alternativum). Flowers yellow to orange, occasionally suffused with red; petals commonly broad. Specimens examined from Nova Scotia, New Brunswick, southern Quebec, New York, Pennsylvania and West Virginia.

LILIUM CANADENSE L. f. **RUBRUM** Britton, Bull. Torr. Bot. Club 17: 125. 1890; *L. canadense* var. *rubrum* (Britton) Waugh ex Bailey, Cycl. Am. Hort. 2: 922. 1900; *L. canadense* β *coccineum* Pursh, Fl. Am. Sept. 1: 229. 1814. Flowers red; petals up to 20 mm. across, usually about 15 mm. broad. Specimen examined from southern Quebec (Huntingdon Co.).

LILIUM CANADENSE L. var. **EDITORUM** Fernald, Rhodora 45: 393. 1943; *L. canadense* ssp. *editorum* (Fernald) Wherry, Bartonia 24: 7. 1947. Median cauline leaves elliptic or oblong to oblong-lanceolate, not acuminate at tip; flowers red; petals narrower, 8–13 mm. across, usually less strongly recurved than in the preceding variety. We have only two specimens at hand. This variety is reported to grow in mountains and upland dry woods from Pennsylvania and southern Indiana south to Alabama.

LILIUM CANADENSE L. ssp. **MICHIGANENSE** (Farwell) stat. n., *L. michiganense* Farwell, Bull. Torr. Bot. Club 42: 353. 1915; *L. michiganense* Farwell, var. *umbelliferum* Farwell, Bull. Torr. Bot. Club 42: 353. 1915; *L. michiganense* Farwell f. *umbelliferum* (Farwell) Wherry, Bartonia 24: 8. 1947. *L. pardalinum* Kellogg var. *Bourgaei* Baker, Journ. Linn. Soc. London, Bot. 14: 242. 1875. Leaves usually scaberulous as in ssp. *canadense*; inflorescence also as in ssp. *canadense*; tepals strongly recurved from below the middle or from near the base, the tips nearly reaching or surpassing the base of the tube as in ssp. *superbum*; flowers orange, commonly reddish; color at base of the tube as in ssp. *canadense*;

midrib of the petal as in ssp. *canadense*, or rarely more or less sharply ridged as in ssp. *superbum*; stamens and pistil long-exserted, usually by about half their length; filaments usually outwardly curved, sometimes incurved again at tip, rarely straight or nearly so; anthers as in ssp. *canadense*. Specimens seen from southern Ontario, Indiana, Illinois, Michigan, Wisconsin, Minnesota and Kansas.

The most reliable distinguishing character between this and the preceding subspecies is the degree of curvature of the tepals. Of all the specimens at hand there is only one which is intermediate in this character: *Cameron* at Niagara Falls, Ont., July 1892. It is a single-flowered plant with spreading tepals as in ssp. *canadense*, but with filaments as in ssp. *michiganense*. As this specimen comes from an area where ssp. *canadense* is not known to occur we have referred it to ssp. *michiganense*.

For an interpretation of var. *Bourgaei* Baker, see Stoker, Roy. Hort. Soc. Lily Year-Book 4: 26. 1935. The type of this variety was reputedly collected in Manitoba "ad ripas lacus Winnipeg" by Bourgeau, but we seriously doubt the accuracy of this geographical statement as no specimen of this very showy plant has ever turned up since or before from anywhere in Manitoba. Furthermore, Bourgeau's localities are notoriously incorrect.

Four phases of this subspecies have been recognized variously as species, subspecies, varieties or forms. These phases may represent no more than ecological forms or more vigorous or depauperate individuals, yet the vigor of some individuals may be susceptible of being segregated genetically. Since this subspecies is definitely of horticultural value, it seems desirable to recognize the two extreme forms as follows:

LILIUM CANADENSE L. ssp. MICHIGANENSE f. **uniflorum** (Farwell) stat. n. *L. michiganense* Farwell var. *uniflorum* Farwell, Bull. Torr. Bot. Club 42: 353-4. 1915; *L. michiganense* Farwell f. *uniflorum* (Farwell) Wherry, Bartonia 24: 8. 1947. Plant usually smaller throughout; flower solitary, terminal. Throughout the range of the subspecies.

LILIUM CANADENSE L. ssp. MICHIGANENSE f. **peramoenum** (Farwell) stat. n. *L. peramoenum* Farwell, Bull. Torr. Bot. Club 42: 354. 1915; *L. michiganense* Farwell f. *peramoenum* (Farwell) Stoker, Roy. Hort. Soc. Lily Year-book 4: 27. 1935. The whole plant more vigorous; leaves more numerous, eight to sixteen to a whorl; flowers large and very numerous. Throughout the range of the subspecies.

The typical phase (forma *michiganense*), including var. *umbelliferum* Farwell, was originally described as having from 5 to 8 flowers. Yellow-flowered mutants have been reported by Wherry, *Rhodora* **44**: 454. 1942, but this phase has not been described and is not clearly represented among the material at hand.

LILIUM CANADENSE L. ssp. **superbum** (L.) stat. n. *L. superbum* L., Sp. Pl. ed. **2**: vol. **1**: 434. 1762. Leaves smooth or sometimes minutely papillose along the margin and the veins underneath; inflorescence umbellate to racemose; flowers orange-red; green zone at base of tube 10–15 mm. long; tepals strongly reflexed as in ssp. *michiganense*; petals sharply ridged on back along the midrib; stamens and pistil long-exserted; filaments recurved; anthers arcuate, linear, 11–25 mm. long.

This subspecies has been reported to range from Georgia and Alabama north to New Hampshire, New York and perhaps Indiana. This range should be extended to include Maine as we have at hand an excellent sheet of this subspecies (*H. N. Moldenke* 18994, Penobscot Co., South Lincoln, July 27, 1947).

Color mutants have been reported for this subspecies, but none has been named and none is represented among the material at hand.

In a recently published chromosome study, R. N. Stewart (The morphology of somatic chromosomes in *Lilium*, *Am. Jour. Bot.* **34**: 9–26. 1947) has, on the basis of their karyotypes, brought together within the same subgroup *L. superbum*, *L. philadelphicum*, *L. catesbaei*, *L. carolinianum* (= *L. michauxii*), *L. michiganense* and *L. canadense*. He remarks: "Five plants of *L. canadense*, two of *L. canadense* var. *rubrum* and two of *L. canadense* var. *flavum* all possessed identical karyotypes and all were indistinguishable from *L. michiganense*." The identity of the karyotypes confirms the opinion previously expressed by Wherry that these two taxa are very closely related indeed. Another taxon of the same subgroup, *L. superbum*, is also closely related to *L. canadense*. A fourth taxon, *L. michauxii* (= *L. carolinianum*), clearly belongs with the *L. canadense* group, but the lack of adequate herbarium material does not allow us to express a considered opinion as to its relative taxonomic status. It is, however, noteworthy that it was at one time reduced to varietal rank as *L. superbum* L. var. *carolinianum*

(Michx.) Chapman. The last two taxa, *L. philadelphicum* and *L. catesbaei*, have erect flowers, long-unguiculate tepals, etc. and are not particularly closely related to the *L. canadense* group.

A key to the major taxa described above has been published by E. T. Wherry, A Key to the Eastern North American Lilies, *Bartonia* **24**: 5–8. 1947.

The present study is based primarily on the specimens preserved in the Herbarium of the Botany and Plant Pathology Division, Science Service, Department of Agriculture, Ottawa (DAO), supplemented by those preserved in the Herbarium of the National Museum of Canada, Ottawa (CAN).

NUTTALL'S QUARREL WITH PURSH

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UNTIL 1936 there was no certainty about Thomas Nuttall's activities or location in 1812 and the years immediately following. Although we are now far better informed, little attention seems to be paid to the light which has been shed on this period. Thinking has not been brought into line with the facts that have been established.¹

Of first importance in Nuttall's situation was his contract with Professor Benjamin Smith Barton, signed on April 7, 1810, before starting on his long expedition through the northwestern Territories. By the contract his journals and observations were the exclusive property of Barton who financed the journey; he was, however, permitted to retain a part of all the specimens which he collected but must not dispose of them without Barton's consent less "they might otherwise fall into the hands of persons who would use them to my disadvantage." "Should I ever publish the journal, I hereby promise and bind myself to make a public acknowledgement, that the journey was performed by you, and to give you full credit for what services you may have rendered to me."

When Nuttall arrived at New Orleans in December, 1811,

¹ F. W. PENNELL, Travels and Scientific Collections of Thomas Nuttall," *Bartonia* **18** (1936), 1–51.

Jeannette E. Graustein, "Nuttall's Travels into the Old Northwest," *Chronica Botanica* **14** (1950/51), 1–88.